

A ~600 kyr duration Early Pleistocene record from the West Turkana (Kenya) HSPDP drill site: elemental XRF variability to reconstruct climate change in Turkana Boy's backyard

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Outcrops in the Kenyan and Ethiopian rift valleys document repeated occurrences of freshwater lakes and wooded landscapes over the past 4 million years at locations that are currently seasonally-dry savanna. Studies of the rich fossil records, in combination with outcropping lacustrine sequences, led to major breakthroughs in our knowledge of driving factors in human evolution. However, study of continuous drill core from ancient lake basins provides a basis for to unravel East African climate dynamics in an unseen fashion.

The Hominin Sites and Paleolakes Drilling Project (HSPDP), and the related Olorgesailie Drilling Project, recovered ~2 km of drill core since 2012. A major project goal is characterization of East African paleoclimate in order to evaluate its impact on hominin evolution. XRF core scanning data provide a means of evaluating records of past environmental conditions continuously and at high resolution. However, the HSPDP records contain complex lithologies reflecting repeated episodes of inundation and desiccation of the lake basins. Nevertheless, careful data evaluation based on detailed lithostratigraphy, which includes smear-slide microscopic analyses and X-radiographic images, allows disentanglement of complex signals and robust identification of continuous sequences for any cyclostratigraphic and statistical analysis.

At the HSPDP Turkana Basin site a 175.6 m-long core the covers the Early Pleistocene time window during which hominids first expanded out of Africa and marine records document reorganization of tropical climate and the development of the strong Walker circulation. This drill site carries particular interest as it is located in only 2.5 km from the location of one of the most complete hominin skeletons ever recovered (Turkana Boy).

Here we present a methodological approach to address the highly variable lithostratigraphy of the East African records to establish comprehensive and environmentally meaningful paleoclimate timeseries. In addition, the XRF record of the changing hydroclimate of the West Turkana Basin from 1.3 to 1.9 kyrs will be explored in relation to regional reconstructions and marine stratigraphies.